

ACCESSION #: 9803030005

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Grand Gulf Nuclear Station, Unit PAGE: 1 OF 3

DOCKET NUMBER: 05000416

TITLE: Manual Reactor Scram Due to MSR Differential Temperature

EVENT DATE: 1/28/98 LER #: 98-001-00 REPORT DATE: 2/25/98

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 1000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Milton L. Jones / Licensing

Specialist TELEPHONE: (601) 437-6198

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On January 28, 1998, the Grand Gulf reactor was manually scrambled from 100% power in accordance with turbine vendor recommended standing orders due to Moisture Separator Reheater (MSR) differential temperature. The standing order specified the scram for protection of the turbine.

The differential temperature resulted from loss of output power from inverter 1Y98. Output of inverter 1Y98 was lost during maintenance activities. The inverter output

supplied power to the temperature control valves for the second stage MSRs. When the temperature delta between the MSRs increased, operators manually scrambled the reactor per standing orders.

The cause of the scram was manual operator action. The apparent cause of loss of the inverter output is that a malfunction of the synchronization board relay circuit and/or the static switch controls led to non-synchronized transfer. Analysis of the sequence of events and personnel observations found that such a failure was consistent with the subsequent events observed (i.e., the blown fuses and loss of power leading to the uneven heating at the MSRs).

The components suspected of failure, static switch controller (master and slave), were replaced and have been sent to the vendor for failure analysis.

This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv).

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A. Reportable Occurrence

On January 28, 1998, the Grand Gulf reactor was manually scrambled from 100 % power based on a turbine vendor recommended standing order due to moisture separator/reheater differential temperature.

This manual actuation of the Reactor Protection System is being reported pursuant to 10 CFR 50.73(a)(2)(iv).

B. Initial Conditions

The plant was in OPERATIONAL CONDITION 1, Power Operations, at approximately 100% power at the time of this event.

C. Description of Occurrence

At approximately 1618 hours on January 28, 1998, a red tag clearance was being restored. The clearance had placed the non-safety related, balance-of-plant inverter 1Y98 loads on the alternate power supply and removed the normal power supply from service.

When the clearance had been installed earlier that morning, approximately 0315 hours, unexpected indication on the inverter panel had occurred. That indication, an illuminated light for fuse failure, did not interfere with the operation of the inverter while on "alternate power supply". During the preventive maintenance, fuses FU2 and FU2A (DC input fuse and associated indicator fuse) were inspected as directed in the task, were found blown, and were replaced. Also, fuse FU204A (indicator fuse for the FU204 output supply fuse) was found blown and was replaced. Fuse FU204 was not inspected nor replaced at that time. The work order was signed off complete and the clearance released for Operations to restore.

Because of the previous problems with blown fuses, the Operations shift requested that Electrical Technicians be present during restoration.

As the Operator restored the clearance and proceeded to place the inverter back to normal in accordance with the system operating instruction, the Manual Bypass Switch was taken to the "Normal Operation" position. As soon as this occurred many control room annunciators associated with loss of power from the inverter illuminated. The Operator was directed to return the Manual Bypass Switch back to "Alternate Source to Load". As soon as this was performed the annunciators associated with the power loss extinguished.

As the control room responded to the annunciators they noticed that the controller for the "A" Moisture Separator/Reheater (MSR) [SB] second stage reheater did not have lights illuminated. Computer points, as defined in operations standing orders were monitored and an Operator was dispatched to the MSR control panels.

Tube leaks in second stage MSR A had necessitated enhanced monitoring based on turbine vendor recommendations. These recommendations were promulgated in a standing order issued January 9, 1998. The order included differential temperature limits, power reduction recommendations, and a manual scram should conditions warrant. The manual scram to protect the turbine would not have been necessary due to inverter 1Y98 failure had it not been for the uneven heating phenomenon from loss of second stage reheat in conduction with the leaking tubes.

The computer points indicated a 40 degree F delta temperature which, per the standing order, required that a manual scram be inserted and that the main turbine be tripped, The reactor mode switch was taken to SHUTDOWN, and the main turbine was tripped after the immediate actions of the Reactor Scram Off-Normal Event Procedure were performed.

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Approximately 15 seconds later the Reactor Core Isolation Cooling (RCIC)[BN] system initiated on low reactor water level. Transient

recorder traces indicate that level decreased to -40 inches. The Feedwater System [SJ] restored level very quickly and RCIC subsequently terminated on high reactor water level.

No Emergency Core Cooling System trains actuated. All Reactor Protection System (RPS) channels actuated as expected. The plant was stabilized and investigation commenced for the loss of power to the MSR controls,

D. Apparent Cause

The cause of the scram was manual operator action. It is likely that a malfunction of the synchronization board relay circuit and/or the static switch controls led to non-synchronized transfer during both the Transfer to Alternate Source and the Transfer from Alternate to Normal Source. Analysis of the sequence of events and personnel observations shows that such a failure would result in the subsequent events observed, i.e., the blown fuses and loss of power leading to the manual scram.

Final root cause analysis is in progress and will include consideration of human factors and vendor failure analysis of the static switch controllers (master and slave).

E. Corrective Actions

The manual scram actions by the operators were appropriate and no corrective actions have been identified as related to the manual scram. Following the plant scram, the blown fuses were replaced and

the silicon controlled rectifiers and other accessible electronics were inspected in accordance with the manufacturer's recommendations, with no other problems found. Subsequently, the master and slave static switch controllers and the synchronization board were replaced. The removed boards were quarantined for vendor failure analysis. Operations cycled the repaired inverter from Normal to Alternate source at least three times to ensure effective operation. The one other similar inverter at Grand Gulf has only BOP functions not significant to plant reliability.

Long term action:

The results of the root cause analysis will determine any necessary changes to improve reliability. These results will be shared with the industry as appropriate.

F. Safety Assessment

The reactor scram was manually initiated to protect BOP equipment and not due to any challenge to NSSS systems. All safety systems responded as designed. The RPS responded as expected and designed with a complete system actuation.

The Reactor Core Isolation Cooling (RCIC) initiated at a level 2 signal while other systems that initiate at a level two signal did not. Investigation determined RCIC level initiation setpoints were conservatively set and a true level of -41.6 inches was not reached, although the initiation occurred within acceptable limits.

G. Additional Information

Energy Industry Identification System (EIIS) codes are identified in
the text within brackets []

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Entergy

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February 25, 1998 Joseph J. Hagan

Vice President

Operations

Grand Gulf Nuclear Station

U.S. Nuclear Regulatory Commission

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Washington, D.C. 20555

Attention: Document Control Desk

SUBJECT: Grand Gulf Nuclear Station

Docket No. 50-416

License No. NPF-29

Manual Reactor Scram Due to MSR Differential Temperature

LER 98-001-00

GNRO-98/00020

Gentlemen:

Attached is Licensee Event Report (LER) 98-001 which is a final report.

Yours truly,

JJH/MLJ

attachment

cc: Ms. J. L. Dixon-Herrity, GGNS Senior Resident (w/a)

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